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Title
Control and dynamics simulation facility at Hughes Space and Communications.

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Abstract
For spacecraft which involve complex attitude or payload control subsystems, and in addition, complex mission operations, a hardware-in-the-loop (HIL) simulation environment is shown to be an essential and cost effective technique for developing and validating mission software, procedures and operations, and is an essential tool for on-orbit problem diagnosis. This paper presents a case history of the application of HIL simulation to the mission development of the Hughes HS601 family of body-stabilized geosynchronous communications satellites. By integrating the HIL simulation, used in the development, qualification and acceptance testing of the attitude control subsystem, with a real-time, digital simulation of the remaining non-ACS spacecraft subsystems (power, thermal, propulsion, telemetry and command, and payload), a comprehensive, high fidelity spacecraft simulator was developed which incorporated critical flight attitude control electronics hardware and software. The simulator system architecture is reviewed, describing applications of this system to ground station software development and its use for validation and mission operations procedure development and evaluation are discussed. The use of the simulator for real-time mission rehearsals, with the simulator linked to the actual mission ground station is described Planned use of the system for mission support and on-orbit

anomaly investigations is reviewed. (1 refs).

Descriptors

aerospace-simulation; artificial-satellites; attitude-control; control-engineering-computing; digital-simulation; dynamics.

Keywords

control simulation facility; dynamics simulation facility; Hughes Space and Communications; attitude control subsystems; payload control subsystems; hardware in the loop simulation environment; HIL simulation; Hughes HS601 body stabilized geosynchronous communications satellites; attitude control subsystem; real time digital simulation; nonACS spacecraft subsystems; critical flight attitude control electronics; ground station software development; mission ground station; on orbit anomaly investigations; mission support.

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